SEQUENCE LISTING

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<120> Methods and Compositions for Synthesis of Nucleic Acid Molecules Using Multiple Recognition Sites

<130> 0942.5340002

<140> 10/005,876

<141> 2001-12-07

<150> 60/254,510

<151> 2000-12-08

<150> 60/291,972

<151> 2001-05-21

<150> 60/318,902

<151> 2001-09-14

<150> 60/325,092

<151>    2001-09-28

<150>    60/333,124

<151>    2001-11-27

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<160>    78

<170>    PatentIn version 3.1

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<223>  Vaccinia topoisomerase cleavable sequence

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<211> 12

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<223> Vaccinia topoisomerase cleavable sequence

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<210> 32

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<223> Vaccinia topoisomerase cleavable sequence

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<210> 33

<211> 28

<212> DNA

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<223> adapter oligonucleotide, TOPO D1

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<223>   adapter oligonucleotide, TOPO D5

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<223>   adapter oligonucleotide, TOPO D4

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<212>   DNA

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<223>   oligonucleotide overhang sequence of TOPO D1 and TOPO D4

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<223> annealing oligonucleotide sequence, TOPO D3

<400> 38
caactgtact atgtc                                                                    15


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<210> 41

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<223>  adapter oligonucleotide, TOPO 1

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<223>  oligonucleotide overhang sequence of TOPO 1

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<400>  43                                                          15
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<223>  DNA sequence of the N-terminus of a theoretical protein

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atggatctga taaa

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<223> PCR primer

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accgatctga taaa                                                              14


<210> 46

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<212> DNA

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<223> DNA sequence of the C-terminus of a theoretical protein

<400> 46
aagtcggagc actcgacgac ggtgtag                                                27


<210> 47

<211> 17

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<223> reverse PCR primer sequence

<400> 47
aaacaccgtc gtcgagt                                                           17


<210> 48

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<223>  DNA sequence of the C-teminus of a theoretical protein

<400>  48                                                                    33
gcggttaagt cggagcactc gacgactgca tag


<210>  49

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<223>  sequence of reverse primer without stop codon

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<223> oligonucleotide primer

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<223> oligonucleotide sequence

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<210> 58

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<212> DNA

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<211> 40

<212> DNA

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<223> oligonucleotide primer

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<212> DNA

<213> artificial sequence


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<223> oligonucleotide primer

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<211> 16

<212> DNA

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<223> amplified end of PCR product

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<212> DNA

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<223> amplified end of PCR product

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<211> 75

<212> DNA

<213> artificial sequence


<220>

<223> map of multiple cloning sites in plasmids pcDNAGW-DT9(sc) and pEN
      TR-DT(sc)

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<210> 68

<211> 10

<212> PRT

<213> artificial sequence


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<223> Amino acid sequence for pcDNAGW-DT9(sc) and pENTR-DT(sc)

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<210> 69

<211> 11

<212> PRT

<213> artificial sequence


<220>

<223> Amino acid sequence for pcDNAGW-DT9(sc) and pENTR-DT(sc)

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<211> 2591

<212> DNA

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<223> Nucleotide sequence of plasmid pENTR/D-TOPO

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<221> Unsure

<222> (691)..(699)

<223> N can be any nucleotide: a, t, c, g.


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gcgcccaata cgcaaaccgc ctctccccgc gcgttggccg attcattaat gcagctggca      180

cgacaggttt cccgactgga aagcgggcag tgagcgcaac gcaattaata cgcgtaccgc      240

tagccaggaa gagtttgtag aaacgcaaaa aggccatccg tcaggatggc cttctgctta      300

gtttgatgcc tggcagttta tggcgggcgt cctgcccgcc accctccggg ccgttgcttc      360

acaacgttca aatccgctcc cggcggattt gtcctactca ggagagcgtt caccgacaaa      420

caacagataa aacgaaaggc ccagtcttcc gactgagcct ttcgttttat ttgatgcctg      480

gcagttccct actctcgcgt taacgctagc atggatgttt tcccagtcac gacgttgtaa      540

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agcaggctcc gcggccgccc cttcaccatg nnnnnnnnna agggtgggcg cgccgaccca    720

gctttcttgt acaaagttgg cattataaga aagcattgct tatcaatttg ttgcaacgaa    780

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<223>   Nucleotide sequence of plasmid pENTR/SD/D-TOPO

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<222>   (710)..(715)

<223>   N can be any nucleotide: a, t, c, g.


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gcgcccaata cgcaaaccgc ctctccccgc gcgttggccg attcattaat gcagctggca   180

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tagccaggaa gagtttgtag aaacgcaaaa aggccatccg tcaggatggc cttctgctta   300

gtttgatgcc tggcagttta tggcgggcgt cctgcccgcc accctccggg ccgttgcttc   360

acaacgttca aatccgctcc cggcggattt gtcctactca ggagagcgtt caccgacaaa   420

caacagataa aacgaaaggc ccagtcttcc gactgagcct ttcgttttat ttgatgcctg   480

gcagttccct actctcgcgt taacgctagc atggatgttt cccagtcac dacgttgtaa   540

aacgacggcc agtcttaagc tcgggcccca ataatgatt ttattttgac tgatagtgac   600

ctgttcgttg caacaaattg atgagcaatg cttttttata atgccaactt tgtacaaaaa   660

agcaggctcc gcggccgcct tgtttaactt taagaaggag cccttcaccn nnnnnaaggg   720

tgggcgcgcc gacccagctt tcttgtacaa agttggcatt ataagaaagc attgcttatc   780

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aaaactgtct gcttacataa acagtaatac aaggggtgtt atgagccata ttcaacggga   1020

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aatctgctgc ttgcaaacaa aaaaaccacc gctaccagcg gtggtttgtt tgccggatca   2040

agagctacca actctttttc cgaaggtaac tggcttcagc agagcgcaga taccaaatac   2100

tgtccttcta gtgtagccgt agttaggcca ccacttcaag aactctgtag caccgcctac   2160

atacctcgct ctgctaatcc tgttaccagt ggctgctgcc agtggcgata agtcgtgtct   2220

taccgggttg gactcaagac gatagttacc ggataaggcg cagcggtcgg gctgaacggg   2280

gggttcgtgc acacagccca gcttggagcg aacgacctac accgaactga gatacctaca   2340

gcgtgagcat tgagaaagcg ccacgcttcc cgaagggaga aaggcggaca ggtatccggt   2400

aagcggcagg tcggaacagg agagcgcac gagggagctt ccaggggga acgcctggta   2460

tctttatagt cctgtcgggt ttcgccacct ctgacttgag cgtcgatttt tgtgatgctc   2520

gtcaggggg cggagcctat ggaaaaacgc cagcaacgcg gcctttttac ggttcctggc   2580
                                                                      2607
cttttgctgg ccttttgctc acatgtt
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<210> 72

<211> 5543

<212> DNA

<213> artificial sequence


<220>

<223> Nucleotide sequence of plasmid pcDNA3.2/V5/GWD-TOPO

<220>

<221> Unsure

<222> (958)..(966)

<223> N can be any nucleotide: a, t, c, g.


<400> 72

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cgagcaaaat ttaagctaca acaaggcaag gcttgaccga caattgcatg aagaatctgc     180
ttagggttag gcgttttgcg ctgcttcgcg atgtacgggc cagatatacg cgttgacatt     240
gattattgac tagttattaa tagtaatcaa ttacggggtc attagttcat agcccatata     300
tggagttccg cgttacataa cttacggtaa atggcccgcc tggctgaccg cccaacgacc     360
cccgcccatt gacgtcaata atgacgtatg ttcccatagt aacgccaata gggactttcc     420
attgacgtca atgggtggac tatttacggt aaactgccca cttggcagta catcaagtgt     480
atcatatgcc aagtacgccc cctattgacg tcaatgacgg taaatggccc gcctggcatt     540
atgcccagta catgacctta tgggactttc ctacttggca gtacatctac gtattagtca     600
tcgctattac catggtgatg cggttttggc agtacatcaa tgggcgtgga tagcggtttg     660
actcacgggg atttccaagt ctccacccca ttgacgtcaa tgggagtttg ttttggcacc     720
aaaatcaacg ggactttcca aaatgtcgta acaactccgc cccattgacg caaatgggcg     780
gtaggcgtgt acggtgggag gtctatataa gcagagctct ctggctaact agagaaccca     840
ctgcttactg gcttatcgaa attaatacga ctcactatag ggagacccaa gctggctagt     900
taagctatca acaagtttgt acaaaaaagc aggctccgcg gccgcccctt caccatgnnn     960
nnnnnnaagg gtgggcgcgc cgacccagct ttcttgtaca agtggttga tctagagggc    1020
ccgcggttcg aaggtaagcc tatccctaac cctctcctcg gtctcgattc tacgcgtacc    1080
ggttagtaat gagtttaaac gggggaggct aactgaaaca cggaaggaga caataccgga    1140
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aggaacccgc gctatgacgg caataaaaag acagaataaa acgcacgggt gttgggtcgt   1200

ttgttcataa acgcggggtt cggtcccagg gctggcactc tgtcgatacc ccaccgagac   1260

cccattgggg ccaatacgcc cgcgtttctt ccttttcccc accccacccc ccaagttcgg   1320

gtgaaggccc agggctcgca gccaacgtcg gggcggcagg ccctgccata gcagatctgc   1380

gcagctgggg ctctaggggg tatccccacg cgccctgtag cggcgcatta agcgcggcgg   1440

gtgtggtggt tacgcgcagc gtgaccgcta cacttgccag cgccctagcg cccgctcctt   1500

tcgctttctt cccttccttt ctcgccacgt tcgccggctt tccccgtcaa gctctaaatc   1560

ggggcatccc tttagggttc cgatttagtg ctttacggca cctcgacccc aaaaaacttg   1620

attagggtga tggttcacgt agtgggccat cgccctgata gacggttttt cgccctttga   1680

cgttggagtc cacgttcttt aatagtggac tcttgttcca aactggaaca acactcaacc   1740

ctatctcggt ctattctttt gatttataag ggattttggg gatttcggcc tattggttaa   1800

aaaatgagct gatttaacaa aaatttaacg cgaattaatt ctgtggaatg tgtgtcagtt   1860

agggtgtgga aagtccccag gctccccagc aggcagaagt atgcaaagca tgcatctcaa   1920

ttagtcagca accaggtgtg gaaagtcccc aggctcccca gcaggcagaa gtatgcaaag   1980

catgcatctc aattagtcag caaccatagt cccgcccctа actccgccca tcccgcccct   2040

aactccgccc agttccgccc attctccgcc ccatggctga ctaatttttt ttatttatgc   2100

agaggccgag gccgcctctg cctctgagct attccagaag tagtgaggag gcttttttgg   2160

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ggccgcttgg gtggagaggc tattcggcta tgactgggca caacagacaa tcggctgctc   2340

tgatgccgcc gtgttccggc tgtcagcgca ggggcgcccg gttctttttg tcaagaccga   2400

cctgtccggt gccctgaatg aactgcagga cgaggcagcg cggctatcgt ggctggccac   2460

gacgggcgtt ccttgcgcag ctgtgctcga cgttgtcact gaagcgggaa gggactggct   2520

gctattgggc gaagtgccgg ggcaggatct cctgtcatct caccttgctc ctgccgagaa   2580

agtatccatc atggctgatg caatgcggcg gctgcatacg cttgatccgg ctacctgccc   2640

attcgaccac caagcgaaac atcgcatcga gcgagcacgt actcggatgg aagccggtct   2700

tgtcgatcag gatgatctgg acgaagagca tcaggggctc gcgccagccg aactgttcgc   2760

caggctcaag gcgcgcatgc ccgacggcga ggatctcgtc gtgacccatg gcgatgcctg   2820

cttgccgaat atcatggtgg aaaatggccg cttttctgga ttcatcgact gtggccggct   2880

gggtgtggcg gaccgctatc aggacatagc gttggctacc cgtgatattg ctgaagagct   2940

tggcggcgaa tgggctgacc gcttcctcgt gctttacggt atcgccgctc ccgattcgca   3000
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gcgcatcgcc ttctatcgcc ttcttgacga gttcttctga gcgggactct ggggttcgcg   3060

aaatgaccga ccaagcgacg cccaacctgc catcacgaga tttcgattcc accgccgcct   3120

tctatgaaag gttgggcttc ggaatcgttt tccgggacgc cggctggatg atcctccagc   3180

gcggggatct catgctggag ttcttcgccc accccaactt gtttattgca gcttataatg   3240

gttacaaata aagcaatagc atcacaaatt tcacaaataa agcatttttt tcactgcatt   3300

ctagttgtgg tttgtccaaa ctcatcaatg tatcttatca tgtctgtata ccgtcgacct   3360

ctagctagag cttggcgtaa tcatggtcat agctgtttcc tgtgtgaaat tgttatccgc   3420

tcacaattcc acacaacata cgagccggaa gcataaagtg taaagcctgg ggtgcctaat   3480

gagtgagcta actcacatta attgcgttgc gctcactgcc cgctttccag tcgggaaacc   3540

tgtcgtgcca gctgcattaa tgaatcggcc aacgcgcggg gagaggcggt ttgcgtattg   3600

ggcgctcttc cgcttcctcg ctcactgact cgctgcgctc ggtcgttcgg ctgcggcgag   3660

cggtatcagc tcactcaaag gcggtaatac ggttatccac agaatcaggg gataacgcag   3720

gaaagaacat gtgagcaaaa ggccagcaaa aggccaggaa ccgtaaaaag gccgcgttgc   3780

tggcgttttt ccataggctc cgcccccctg acgagcatca caaaaatcga cgctcaagtc   3840

agaggtggcg aaacccgaca ggactataaa gataccaggc gtttccccct ggaagctccc   3900

tcgtgcgctc tcctgttccg accctgccgc ttaccggata cctgtccgcc tttctccctt   3960

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cagttacctt cggaaaaaga gttggtagct cttgatccgg caaacaaacc accgctggta   4320

gcggtggttt ttttgtttgc aagcagcaga ttacgcgcag aaaaaaagga tctcaagaag   4380

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tcagtgaggc acctatctca gcgatctgtc tatttcgttc atccatagtt gcctgactcc   4620

ccgtcgtgta gataactacg atacgggagg gcttaccatc tggccccagt gctgcaatga   4680

taccgcgaga cccacgctca ccggctccag atttatcagc aataaaccag ccagccggaa   4740

gggccgagcg cagaagtggt cctgcaactt tatccgcctc catccagtct attaattgtt   4800

gccgggaagc tagagtaagt agttcgccag ttaatagttt gcgcaacgtt gttgccattg   4860
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ctacaggcat cgtggtgtca cgctcgtcgt ttggtatggc ttcattcagc tccggttccc   4920

aacgatcaag gcgagttaca tgatccccca tgttgtgcaa aaaagcggtt agctccttcg   4980

gtcctccgat cgttgtcaga agtaagttgg ccgcagtgtt atcactcatg gttatggcag   5040

cactgcataa ttctcttact gtcatgccat ccgtaagatg cttttctgtg actggtgagt   5100

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gttcttcggg gcgaaaactc tcaaggatct taccgctgtt gagatccagt tcgatgtaac   5280

ccactcgtgc acccaactga tcttcagcat cttttacttt caccagcgtt tctgggtgag   5340

caaaaacagg aaggcaaaat gccgcaaaaa agggaataag ggcgacacgg aaatgttgaa   5400

tactcatact cttccttttt caatattatt gaagcattta tcagggttat tgtctcatga   5460

gcggatacat atttgaatgt atttagaaaa ataaacaaat aggggttccg cgcacatttc   5520

cccgaaaagt gccacctgac gtc                                           5543
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<210> 73

<211> 5173

<212> DNA

<213> artificial sequence


<220>

<223> Nucleotide sequence of plasmid pcDNA6.2/V5/GWD-TOPO

<220>

<221> Unsure

<222> (958)..(966)

<223> N can be any nucleotide: a, t, c, g.


<400> 73
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cgagcaaaat ttaagctaca acaaggcaag gcttgaccga caattgcatg aagaatctgc   180

ttagggttag gcgttttgcg ctgcttcgcg atgtacgggc cagatatacg cgttgacatt   240

gattattgac tagttattaa tagtaatcaa ttacggggtc attagttcat agcccatata   300

tggagttccg cgttacataa cttacggtaa atggcccgcc tggctgaccg cccaacgacc   360
```

```
cccgcccatt gacgtcaata atgacgtatg ttcccatagt aacgccaata gggactttcc      420

attgacgtca atgggtggag tatttacggt aaactgccca cttggcagta catcaagtgt      480

atcatatgcc aagtacgccc cctattgacg tcaatgacgg taaatggccc gcctggcatt      540

atgcccagta catgacctta tgggactttc ctacttggca gtacatctac gtattagtca      600

tcgctattac catggtgatg cggttttggc agtacatcaa tgggcgtgga tagcggtttg      660

actcacgggg atttccaagt ctccacccca ttgacgtcaa tgggagtttg ttttggcacc      720

aaaatcaacg ggactttcca aaatgtcgta caactccgc cccattgacg caaatgggcg      780

gtaggcgtgt acggtgggag gtctatataa gcagagctct ctggctaact agagaaccca      840

ctgcttactg gcttatcgaa attaatacga ctcactatag ggagacccaa gctggctagt      900

taagctatca acaagtttgt acaaaaaagc aggctccgcg ccgccccctt caccatgnnn      960

nnnnnnaagg gtgggcgcgc cgacccagct ttcttgtaca aagtggttga tctagagggc      1020

ccgcggttcg aaggtaagcc tatccctaac cctctcctcg gtctcgattc tacgcgtacc      1080

ggttagtaat gagtttaaac gggggaggct aactgaaaca cggaaggaga cataccgga      1140

aggaacccgc gctatgacgg caataaaaag acagaataaa acgcacgggt gttgggtcgt      1200

ttgttcataa acgcggggtt cggtcccagg gctggcactc tgtcgatacc ccaccgagac      1260

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attagggtga tggttcacgt agtgggccat cgccctgata dacggttttt cgccctttga      1680

cgttggagtc cacgttcttt aatagtggac tcttgttcca aactggaaca acactcaacc      1740

ctatctcggt ctattctttt gatttataag ggattttggg gatttcggcc tattggttaa      1800

aaaatgagct gatttaacaa aaatttaacg cgaattaatt ctgtggaatg tgtgtcagtt      1860

agggtgtgga aagtccccag gctccccagc aggcagaagt atgcaaagca tgcatctcaa      1920

ttagtcagca accaggtgtg gaaagtcccc aggctcccca gcaggcagaa gtatgcaaag      1980

catgcatctc aattagtcag caaccatagt cccgccccta actccgccca tcccgcccct      2040

aactccgccc agttccgccc attctccgcc ccatggctga ctaatttttt ttatttatgc      2100

agaggccgag gccgcctctg cctctgagct attccagaag tagtgaggag gcttttttgg      2160

aggcctaggc ttttgcaaaa agctcccggg agcttgtata tccattttcg gatctgatca      2220
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gcacgtgttg acaattaatc atcggcatag tatatcggca tagtataata cgacaaggtg    2280

aggaactaaa ccatggccaa gcctttgtct caagaagaat ccaccctcat tgaaagagca    2340

acggctacaa tcaacagcat ccccatctct gaagactaca gcgtcgccag cgcagctctc    2400

tctagcgacg gccgcatctt cactggtgtc aatgtatatc attttactgg gggaccttgt    2460

gcagaactcg tggtgctggg cactgctgct gctgcggcag ctggcaacct gacttgtatc    2520

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gagcttggcg taatcatggt catagctgtt tcctgtgtga aattgttatc cgctcacaat    3060

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ccagctgcat taatgaatcg gccaacgcgc ggggagaggc ggtttgcgta ttgggcgctc    3240

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gcgaaacccg acaggactat aaagatacca ggcgtttccc cctggaagct ccctcgtgcg    3540

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caagctgggc tgtgtgcacg aacccccccgt tcagcccgac cgctgcgcct tatccggtaa    3720

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taacaggatt agcagagcga ggtatgtagg cggtgctaca gagttcttga agtggtggcc    3840

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cttcggaaaa agagttggta gctcttgatc cggcaaacaa accaccgctg gtagcggttt    3960

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acctatctca gcgatctgtc tatttcgttc atccatagtt gcctgactcc ccgtcgtgta   4260

gataactacg atacgggagg gcttaccatc tggccccagt gctgcaatga taccgcgaga   4320

cccacgctca ccggctccag atttatcagc aataaaccag ccagccggaa gggccgagcg   4380

cagaagtggt cctgcaactt tatccgcctc catccagtct attaattgtt gccgggaagc   4440

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gcgagttaca tgatccccca tgttgtgcaa aaaagcggtt agctccttcg gtcctccgat   4620

cgttgtcaga agtaagttgg ccgcagtgtt atcactcatg gttatggcag cactgcataa   4680

ttctcttact gtcatgccat ccgtaagatg cttttctgtg actggtgagt actcaaccaa   4740

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atttgaatgt atttagaaaa ataaacaaat aggggttccg cgcacatttc cccgaaaagt   5160

gccacctgac gtc                                                       5173
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<210> 74

<211> 69

<212> DNA

<213> artificial sequence


<220>

<223> Partial sequence of pENTR/SD-dTOPO

<220>

<221> Unsure

<222> (64)..(69)

<223> N can be any nucleotide: a, t, c, g.

<400> 74
ttgtacaaaa aagcaggctc cgcggccgcc ttgtttaact ttaagaagga gcccttc     57

accatgnnnn nn                                                       69


<210>   75

<211>   52

<212>   DNA

<213>   artificial sequence


<220>

<223>  Nucleotide sequence of TOPO-D71

<400>   75
ggccgccttg tttaacttta agaaggagcc cttcaccgac tatgtacagtt g          52


<210>   76

<211>   31

<212>   DNA

<213>   artificial sequence


<220>

<223>  Nucleotide sequence of TOPO-D73

<400>   76
ggccgccccc ttcaccgact atgtacagtt g                                  31


<210>   77

<211>   28

<212>   DNA

<213>   artificial sequence


<220>

<223>  Nucleotide sequence of TOPO-D75

<400>   77
cgcgcccacc cttgacatag tacagttg                                      28


<210>   78

<211> 14

<212> PRT

<213> artificial sequence


<220>

<223> Partial amino acid sequence of pENTR-dTOPO and pcDNAGW-dTOPO

<400> 78

Leu Tyr Lys Lys Ala Gly Ser Ala Ala Ala Pro Phe Thr Met
1               5               10


<210> 79

<211> 13

<212> PRT

<213> artificial sequence


<220>

<223> Partial amino acid sequence of pENTR/SD-dTOPO, pENTR-dTOPO, and
        pcDNAGW-dTOPO

<400> 79

Lys Gly Gly Arg Ala Asp Pro Ala Phe Leu Tyr Lys Val
1               5               10


<210> 80

<211> 15

<212> DNA

<213> artificial sequence


<220>

<223> Product of binding a topoisomerase to part of a nucleic acid molecule

<220>

<221> Unsure

<222> (13)..(15)

<223> N can be any nucleotide: a, t, c, g.

<400>  80
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